Seminario

Giovedì 24 marzo 2022,

ore 16 Aula Newton

Emanuele Castorina - Università di Milano

Testing the equivalence principle in the dark sector

The equivalence between the inertial and gravitational mass is built-in the formulation of General Relativity as the curvature of space time. In the visible sector, the equivalence principle has been tested with extraordinary precision using torsion balance experiments, but very little is known about the presence of long range fifth forces in the dark sector. In this talk I will describe how we can use cosmological data to test whether dark matter violates the equivalence principle. The Universe itself will act as a scale that measures if dark matter particles fall in the same way as ordinary particles. After presenting the main effects of dark 5fifth forces on cosmological observables like the CMB and matter power spectrum, I will present the constraints on the strength of the new interaction using Planck and BAO data. Our results indicate that equivalence principle violations in the dark sector are at most a few parts in one thousand, which is the best available bound on such new forces. Finally, I will discuss the implications of our findings in the broader context of the constraints on the equivalence principle in the visible sector, and what they imply for the coupling between the dark matter and the standard model, which is of relevance for direct detection experiments of dark matter.

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